THE WARBLER

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Dear Students, Artists, Thinkers,

Here is our second newsletter—the first where we shift to a thematic approach. This one is for the birds! Maybe you are wondering out of all things in the universe, why birds? Part of it is related to our logo, which was heavily influenced by Maya Angelou's *I Know Why the Caged Bird Sings*, and *To Kill a Mockingbird*, by Harper Lee. But it was also conceived within the idea of flight, and all the metaphors therein. A **metaphor** is a figure of speech that makes an implicit, implied, or hidden comparison between two things that are unrelated, but which share some common characteristics. Imagine all the metaphors for birds and flight.

The anatomy and actions of birds have had tremendous influence on how aviation evolved (think about those wings)—inventors and scientists wondered, how can humans fly? We wanted to be like the birds. As you'll read inside this issue, birds have also had a tremendous influence on other aspects of the engineering world beyond the airplane.

Birds have a whole beautiful language of sound—a communication that we humans cannot know. There is something incredible about the fact that we cannot know, and that we must rely on our imagination to wonder. This wondering, the curiosity, the idea of something drives human beings to learn and create. Birds are ancient creatures with the ability to do simple math. Even with our advanced knowledge, there is still so much that we do not know about them. This is one of the reasons they remain a consistent source of inspiration, along with their flight and song.

So why did we call this *The Warbler* ... warblers are among the most common songbirds. They signify the beauty and wonder of the everyday. We humans associate beauty and joy with their song, and that sound is a goodness; it makes us glad. Inside you will find all kinds of interesting information on birds, some prompts for trying to draw one yourself, and a most beloved poem by Mary Oliver. We hope that you enjoy the newsletter.

Kyes Stevens and the APAEP Team

WORDS INSIDE

IN "WOODPECKERS ..."

excavate | make a hole or channel by digging

incubate | sit on eggs in order to keep them warm and bring them to hatching

IN "WHY BIRDS ARE ..."

accretion | the process of growth or increase, typically by the gradual accumulation of additional layers or matter

quintessence | the most perfect or typical example of a quality or class

IN "BIRD BIOLOGY ..."

augmented | having been made greater in size or value

predilection | a preference or special liking for something; a bias in favor of something

• • •

"I think we consider too much the good luck of the early bird and not enough the bad luck of the early worm."

PRESIDENT FRANKLIN D. ROOSEVELT

HISTORY

Bird Biology and the Arts

BY PAUL R. EHRLICH, DAVID S. DOBKIN, AND DARRYL WHEYE

Artists throughout history have drawn inspiration from the birds. Part-bird, part-human forms have frequently been used to depict either supernatural phenomena or enhanced human abilities, especially those of vision and speed. Perhaps the oldest artistic representation of birds or parts of birds is a prehistoric bird-headed man dating from 15,000-10,000 BC painted on one of the walls of the Lascaux Cave in France -- the treasure-house of Stone Age art.

Ancient Egyptians considered birds "winged souls" and used them to symbolize particular gods. The symbol for Horus, god of the sun, was the head or body of a falcon. In a statue of King Chefren from Giza on his throne (2500 BC), the king is not seated alone -- the falcon of Horus is perched behind his head, and its wings enfold the king's shoulders. The bird appears to be watching over the king and his realm. Raptors subsequently have often been used to represent national power -- including the national symbol of the United States. Whereas predatory birds often symbolize power, doves depict peace.

Symbolic winged chimeras like Pegasus, the flying horse, are recurrent. The power of the sphinx, indicated by the merging of a human head onto a lion's body, is sometimes augmented by the wings of a bird. Both victory and liberty continue to be associated with bird wings. They are, for example, the outstanding feature of the renowned Hellenistic marble sculpture the "Winged Victory" of Samothrace (200 BC). That partly airborne goddess, in turn, became the prototype for countless modem political paintings and cartoons.

Goldfinches, which appear commonly in illuminated manuscripts in the Middle Ages, were associated with the Christ child. In southern Italy and Sicily goldfinches were commonly released at the time a figure representing the risen Christ appeared at Easter celebrations. Could the predilection of goldfinches for prickly thistles have recalled the crown of thorns and thus led to their association with Christ? During the Renaissance most paintings were religious and bird-winged angels were common. It would seem that the countless depictions of the Annunciation differ most in the use of wings from different bird species.

Native Americans were consummate bird artists. They used depictions of ravens (which played a central role in their religion), eagles, and oystercatchers in carved masks as well as on painted screens, drums, and boxes. While the symbolic use of birds is ancient, depictions of bird biology are by no means a modern invention. For instance, a tick bird picking parasites from the back of a bull is painted on a piece of pottery dating to the late Mycenaean (1,000 BC), and an early book contains a picture of an owl being mobbed.

The realistic depiction of birds in nature became increasingly evident in 18th-century paintings, but illustrating bird biology was not elevated to its current position as an artform until the work of John James Audubon in the early 1800s. Audubon was among the first artists to accurately portray bird biology and certainly the first to consistently paint his subjects with such drama as to establish himself as a significant figure in art history as well.

Reproductions of his life-size watercolors were printed in the famous *Birds of America*. The outlines were printed from huge engraved copper plates, and the coloring done expertly by hand. The pictures often illustrated birds' varying plumages, nests, feeding habits, defense techniques, and so on. At an auction in late 1985 many plates, including the Flamingo, the Trumpeter Swan, the Gyrfalcons, and the Snowy Owls, sold for over $25,000 each.

Bird vocalizations often figure in works of literature, especially poetry, as the words of Milton, Keats, and Shelley about the songs of nightingales remind us. The call of the cuckoo has been featured in the chorus of a lullaby. The courtship rituals of cranes, ravens, and oystercatchers are mimicked in the dances of African tribes, the Ainu of Japan, Australian Aborigines, and Native Americans. Cranes may have influenced ballet in much the same way Peter Tchaikovsky was influenced by swans more than a century ago when he composed Swan Lake.

The symbolic use of birds continues today unabated. Many advertisements feature the Bald Eagle or assorted hawks to suggest patriotism, dependability, speed, or machismo. The "proud" peacock is the symbol of a major news network. Film clips of birds flying, feeding, singing, and courting are frequently used in nature programs to indicate the peaceful, primeval conditions rapidly disappearing from our planet. Children raised with the image of an all-knowing "Big Bird" may well see birds differently than their parents, raised with Woody Woodpecker and Daffy Duck, did, but it seems certain that birds and their biology will, in one way or another, remain embedded in the arts and human psyche for a long time to come. ●

I'M THE PART OF THE BIRD THAT'S NOT IN THE SKY. I CAN SWIM IN THE OCEAN AND YET REMAIN DRY. **WHAT AM I?**

IT'S NOT A BIRD, THOUGH FEATHERED, AND IT HAS A MOBILE NEST. IT'S QUICK IN FLIGHT AND, HAVING FLOWN, IT ALWAYS STOPS TO REST. **WHAT IS IT?**

FACT: THE FASTEST BIRD ON EARTH IS THE **PEREGRINE FALCON**. WHEN IN ITS HUNTING DIVE, IT CAN REACH A MAXIMUM RECORDED AIRSPEED OF 242 MPH. THE FASTEST BIRD WHEN IN A LEVEL FLIGHT IS THE **COMMON SWIFT** WHICH HAS A MAXIMUM RECORDED AIRSPEED OF 105 MPH.

SCIENCE

Why Birds Are the World's Best Engineers

BY SIOBHAN ROBERTS | *The New York Times*, March 17, 2020

The term "bird's nest" has come to describe a messy hairdo, tangled fishing line and other knotty conundrums. But that does birds an injustice. Their tiny brains, dense with neurons, produce marvels that have long captured scientific interest as naturally selected engineering solutions — yet nests are still not well understood.

One effort to disentangle the structural dynamics of the nest is underway in the lab of Hunter King, an experimental soft-matter physicist at the University of Akron in Ohio.

Dr. King seeks to answer simple questions: What is the underlying mechanical principle behind the bird nest's construction strategy? What are the statistically robust characteristics of "the nest state"? That is to say, what separates a nest from the same sticks and twigs collected into a tight bundle or scattered helter-skelter?

For the study's nest-building protagonist, Dr. King chose the cardinal, because in building her nest she essentially just shoves sticks together; the robin complicates matters with mud.

In modeling the delicate interplay of nest geometry, elasticity and friction, Dr. King fashioned an experiment with "a little bit of a steampunk style." They built an artificial nest: a cylinder containing hundreds of laser cut bamboo skewers. Then around it they created a rubber chamber to measure the response of the nest when it was repeatedly compressed.

Dr. King surveyed the array of nest-building materials, from the round grains of sand to the slender filaments in cotton balls, that possess emergent properties: When the elements are packed together randomly, they behave collectively, in a process called jamming.

"If we think of the bird-nest material as a bunch of sticks that are just jammed together, which to some very crude degree is accurate, then as a material it would fall somewhere in the spectrum between sand and cotton," Dr. King said.

As a reference, he pointed to a 2012 paper that explored how heavy-duty Duo-Fast staples, or "u-particles," cohere and interpenetrate into a clump. He also noted a 2016 paper on "aleatory architecture." In Latin, alea refers to dice or gambling; the researchers asked whether design could arise from disorder: "Can we develop a vocabulary of concepts to interpret various orderings by chance?"

Easier said than done. The Beijing National Stadium, known as the "Bird's Nest," was initially designed to be an accretion of truly randomly placed pieces. But the conceptual goal ultimately failed, owing to engineering restrictions: The structure is a highly ordered 42,000 tons of steel, a mere "monument to a metaphor," the researchers noted.

Of course, a bird's nest is not entirely random; the builder weaves or places the elements. But what is the universal logic? What is the quintessence of "the nest state"? Like a bird building a nest, Dr. King hopes that a "flexibility in thinking" will "let the underlying story emerge."

He and his collaborators have explored how the materials in the artificial nest pack together, and how the ensemble absorbs energy. So far, they have observed what Dr. King called "a steady state hysteresis caused by reversible slippage."

The term "hysteresis" is derived from the ancient Greek, meaning "deficiency" or "lagging behind." Simply put, it describes how a physical system behaves differently depending on what was done to it previously — the system has a history. Hang two one-pound weights from a rubber band, then remove one. With only one weight remaining, the band will be still stretched farther than if only one weight had been added in the first place. That is hysteresis. The rubber band is not behaving like an ideal spring; there is an energy loss to the system.

The piopio's nest.
Museum of New Zealand Te Papa Tongarewa

Something similar happened with the "nests" in Dr. King's plexiglass cylinder. The sticks were slowly compressed to maximum stress, and then released, repeatedly. During each cycle, the sticks compressed a little more and then bounced back, but only partway; this was hysteresis happening. Eventually, for any given skinniness of stick — its aspect ratio, diameter divided by length — the system found its maximum, or steady state, density.

Then the experimenters shmushed the sticks some more, with additional cycles. But their data suggested that hysteresis was still happening. This was unexpected and intriguing; the sticks were at density, and they didn't seem to be rearranging any further in the shmushing chamber.

With computer simulations, they landed on an explanation. The sticks were in fact compressing further, slightly rearranging as one stick slid along another. But this slippage undid itself upon release — "reversible slippage." The nest became an asymmetric spring: stiff when pushed, soft upon release.

This phenomenon might be exactly what the investigators are after: A process that underlies a nest's machinations — its fundamental mechanical response under force — and one that should be present in other systems. ●

MATHEMATICS

Sudoku

#3 PUZZLE NO. 4056269

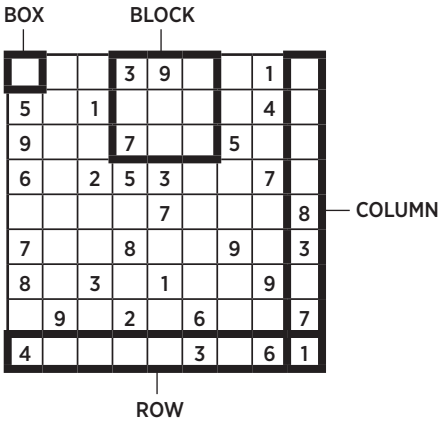
		2			9			
	5			7				
			6			7		5
7							2	8
			9	3				
9		1						6
2					1	5	3	
		8		5				
		6	3					4

#4 PUZZLE NO. 4056483

			7	4				9
				9		5	8	
9	7	5	3		8			2
			5	1	9			
					4			
		4				7	6	1
4		8						
				5	1			
1	6						9	

SUDOKU HOW-TO GUIDE

1. Each block, row, and column must contain the numbers 1–9.
2. Sudoku is a game of logic and reasoning, so you should not need to guess.
3. Don't repeat numbers within each block, row, or column.
4. Use the process of elimination to figure out the correct placement of numbers in each box.
5. The answers appear on the last page of this newsletter.



What the example will look like solved

2	4	8	3	9	5	7	1	6
5	7	1	6	2	8	3	4	9
9	3	6	7	4	1	5	8	2
6	8	2	5	3	9	1	7	4
3	5	9	1	7	4	6	2	8
7	1	4	8	6	2	9	5	3
8	6	3	4	1	7	2	9	5
1	9	5	2	8	6	4	3	7
4	2	7	9	5	3	8	6	1

WHAT HAS TO BE BROKEN BEFORE YOU CAN USE IT? // **WHAT IS SO FRAGILE** THAT SAYING ITS NAME BREAKS IT?

DID YOU KNOW?

The most common wild bird in the world isn't the sparrow or blue jay—it's the **red-billed quelea**, which lives in Africa and has an estimated population of 1.5 billion.

Redondo Beach, CA adopted the Goodyear Blimp as the city's official bird in 1983.

Bats are the only mammal that can actually fly.

Birds originally descended from reptiles. The Archaeopteryx is the earliest known bird which lived approximately 147 million years ago. This bird was so different to today's birds, as not only did it have a long bony tail, it also had teeth!

A chicken with red earlobes will produce brown eggs, and a chicken with white earlobes will produce white eggs.

Source: "101 Fun Facts You Never Knew, Guaranteed to Totally Blow Your Mind" by *Parade*. *Parade Magazine*, 16 Dec. 2019. "101 Amazing Facts Everyone Should Know" by Jason English. *Mental Floss*. 6 Mar. 2014. *Love the Garden*, 2020 Evergreen Garden Care.

Bird Sound Mnemonics

Songs and Calls of Eastern North American Birds

ROSEMARY MOSCO, BIRD AND MOON COMICS

Idiom

"Beat around the bush"

Meaning To circle the point; to avoid the point.

Example *Stop beating around the bush and tell me what really happened.*

Origin This common phrase is thought to have originated in response to game hunting in Britain. While hunting birds, participants would beat bushes in order to draw out the birds. Therefore, they were beating around the bush before getting to the main point of the hunt: actually capturing the birds.

Source: "7 Everyday English Idioms and Where They Come From" by Kate Lohnes. *Britannica*.

A person enters a pet shop and sees a beautiful parrot. The seller guarantees him that the bird repeats everything it hears, so the person buys it. However, when he goes back home and tests the bird, it turns out that it doesn't say a word. The buyer goes to the shop to complain to the seller, but the seller argues he has not lied. **HOW IS THIS POSSIBLE?**

ART + CULTURE

Wild Geese

BY MARY OLIVER

You do not have to be good.
You do not have to walk on your knees
For a hundred miles through the desert, repenting.
You only have to let the soft animal of your body
love what it loves.
Tell me about your despair, yours, and I will tell you mine.
Meanwhile the world goes on.
Meanwhile the sun and the clear pebbles of the rain
are moving across the landscapes,
over the prairies and the deep trees,
the mountains and the rivers.
Meanwhile the wild geese, high in the clean blue air,
are heading home again.
Whoever you are, no matter how lonely,
the world offers itself to your imagination,
calls to you like the wild geese, harsh and exciting —
over and over announcing your place
in the family of things.

Mary Jane Oliver was an American poet who won the National Book Award and the Pulitzer Prize. In 2007 *The New York Times* described her as "far and away, this country's best-selling poet." Oliver lived in Provincetown, Massachusetts, and Hobe Sound, Florida, until her death in early 2019 at the age of 83.

WRITING PROMPT
John Donne once wrote, "No man is an island entire of itself ..." meaning that everyone of us is connected, a small part of a larger whole. No one is completely separated. Write a poem in which you explore these connections—how do you fit in with honking geese, the mountains and rivers, and the rest of the world?

Word Search

T	A	I	B	S	O	E	E	L	A	M	I	N	A
R	E	S	L	L	N	B	L	S	S	A	E	S	E
N	P	P	D	E	B	L	A	E	E	I	N	O	D
D	E	F	A	M	I	L	Y	L	P	E	A	F	C
L	U	E	N	O	C	D	D	B	A	X	E	T	G
U	L	S	E	M	E	E	A	B	C	C	L	T	O
T	B	E	E	L	S	P	I	E	S	I	C	N	O
F	S	D	O	E	B	L	D	P	D	T	G	G	D
E	O	A	R	O	R	E	E	L	N	I	R	L	A
A	N	T	D	L	S	T	K	S	A	N	Y	O	G
E	E	Y	I	K	S	E	N	O	L	G	L	N	K
P	K	W	G	S	L	I	A	E	F	T	L	S	N
I	M	A	G	I	N	A	T	I	O	N	I	S	C
C	Y	G	E	E	S	E	W	E	B	P	X	S	L

LANDSCAPES
BODY
GOOD
FAMILY
BLUE
PEBBLES
ANIMAL
CLEAN
WALK
EXCITING
IMAGINATION
DESERT
TREES
SOFT
GEESE

CHARLEY HARPER *(August 4, 1922 – June 10, 2007)* was a Cincinnati-based American Modernist artist. He was best known for his highly stylized wildlife prints, posters and book illustrations.

When once asked to describe his art style, Harper replied, "When I look at a wildlife or nature subject, I don't see the feathers in the wings, I just count the wings. I see exciting shapes, color combinations, patterns, textures, fascinating behavior and endless possibilities for making interesting pictures. I regard the picture as an ecosystem in which all the elements are interrelated, interdependent, perfectly balanced, without trimming or unutilized parts; and herein lies the lure of painting; in a world of chaos, the picture is one small rectangle in which the artist can create an ordered universe."

Charley Harper asks the people who enjoy his art to "remember that I didn't start out to paint a bird—the bird already existed. I started out to paint a picture of a bird, a picture which didn't exist before I came along, a picture which gives me a chance to share with you my thoughts about the bird. Once you accept this seemingly simplistic but really quite profound premise, you will appreciate the many varied approaches to the making of pictures, all of which start where realism leaves off, but all of which require an understanding of realism for their successful execution."

LOCAL HISTORY

Woodpeckers of Alabama

BY SARIN TIATRAGUL | Auburn University

Woodpeckers encompass 210 species of birds best known for their distinctive "head-banging" behavior. They belong to the order Piciformes and the family Picidae, which can be found worldwide except for Madagascar, Australia, New Guinea, New Zealand, and the polar regions. Alabama is home to eight species of woodpeckers, with a ninth species, the ivory-billed woodpecker, widely believed to be extirpated. These eight species are the downy woodpecker, hairy woodpecker, red-bellied woodpecker, red-headed woodpecker, pileated woodpecker, yellow-bellied sapsucker, northern flicker (the state bird colloquially known as Yellowhammer), and the endangered red-cockaded woodpecker.

In most woodpecker species, both males and females work together to excavate nest cavities in dead trees, limbs of trees, or fence posts. Typically, a pair of woodpeckers excavates one cavity for the breeding season, and they often have alternative cavities for sleeping. Nesting cavities typically have a round opening that leads to an enlarged hollow chamber where the female lays her eggs. The number of eggs laid per clutch ranges from two to six eggs for the red-bellied woodpecker and from three to ten eggs for the red-headed woodpecker. Females incubate the eggs for 11 to 20 days, depending on the species. Hatchlings are born naked and helpless and develop in the nest from 18 to 30 days before fledging. During this time, both parents take turns feeding the young. Woodpeckers create more cavities than they can simultaneously occupy, and unused woodpecker cavities are important nest sites for other species, such as great-crested flycatchers and eastern bluebirds, that cannot excavate their own holes.

Woodpeckers communicate by calling and drumming. Woodpecker calls are generally repeated short sequences, but the pitch and frequencies differ among species. Woodpecker drumming is a form of communication that involves forceful banging of the beak on solid surfaces. Birds in urban areas also take advantage of manufactured materials that amplify sound such as gutters, chimneys, vents, and even barbeque grills as drumming surfaces. Such behavior in humans would cause brain injury, but woodpeckers can repeatedly knock their heads safely into solid surfaces. Multiple scientific studies suggest that the unique structure of a woodpecker's skull and beak enables them to absorb the shock. The upper beak is longer than the lower beak, which helps divert the force of impact to the lower jaw. The bones at the front of the skull are spongy at the interior, and this structure cushions the brain within the skull during drumming.

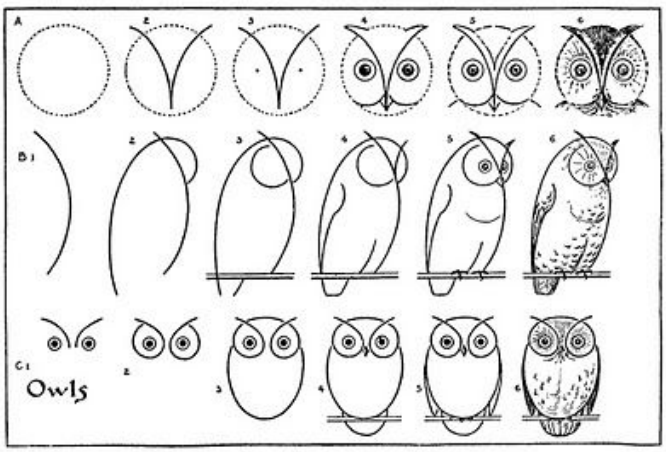
Worldwide, woodpeckers occupy a variety of habitats, from tropical rainforest to grasslands to desert. In Alabama, all species require trees but they are found from the interior of large forests to individual trees in pastures. For most species, ideal habitat includes rotting or dead wood that harbors insect prey and affords places to build nest cavities. In Alabama, however, northern flickers reach their highest densities in small towns and suburbs, where they feed on lawns and sometimes nest and roost in shingles or wooden siding of houses. Most woodpeckers in Alabama are non-migratory, meaning they remain in the same habitat year-round, but the yellow-bellied sapsucker is highly migratory and only visits Alabama in the winter.

Red-headed woodpecker

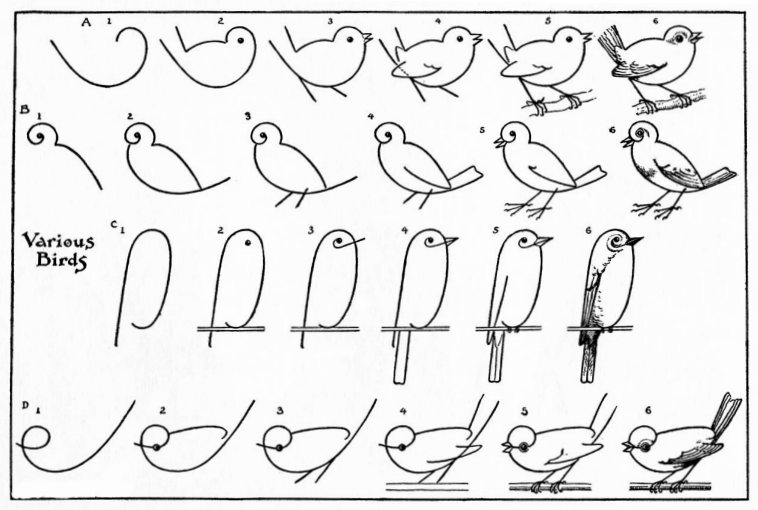
Adult woodpeckers forage for fruits, seeds, and nuts, but their main diet consists of insects. In some species, the tongue splits in two at the back and extends up and around the skull and ends at the nasal cavity when retracted. This unique morphology allows woodpeckers to extend their tongue about three times the length of their beaks. Yellow-bellied sapsuckers are unusual in relying on sap as their main food source, drilling a series of holes in trees and returning to them often to drink the sugary, energy-laden sap that seeps out. ●

Used with permission of the Encyclopedia of Alabama

HOW TO DRAW ...



HOW TO DRAW ...



A Note of Support

Currently, the entire world is facing a huge challenge: the COVID19 (Coronavirus) pandemic. Every era has its share of challenges: dictators and conquerors, natural disasters, plagues and pestilence, environmental hazards, nuclear threats and crises, riots, wars, and maybe, in the future--aliens from outer space!

I think it's important for all of us to choose an attitude in these tough times that gives us strength. You can choose many words for that attitude that will give you strength: determination, grit, optimism, hope, courage, perseverance, doggedness, will power, commitment, or resolve. You can even choose a different word for your attitude each day, just to make it though that day. It's your choice. It's your attitude.

Charles Swindoll says, "The longer I live, the more I realize the impact of attitude on life. Attitude, to me, is more important than facts. It is more important than the past, than education, than money, than circumstances, than failures, than successes, than what other people think or say or do. It is more important than appearance, giftedness or skill. ... The remarkable thing is we have a choice every day regarding the attitude we will embrace for that day. We cannot change our past...we cannot change the fact that people will act in a certain way. We cannot change the inevitable. The only thing we can do is play on the one string we have, and that is our attitude ... I am convinced that life is 10% what happens to me and 90% how I react to it. And so it is with you ... we are in charge of our attitudes."

I chose strength as my word for these really tough times. We're facing this all together, and we'll get through this, all together.

Fran

Answers

SUDOKU #3

1	7	2	5	4	9	8	6	3
6	5	3	1	7	8	4	9	2
4	8	9	6	2	3	7	1	5
7	3	5	4	1	6	9	2	8
8	6	4	9	3	2	1	5	7
9	2	1	7	8	5	3	4	6
2	4	7	8	6	1	5	3	9
3	9	8	2	5	4	6	7	1
5	1	6	3	9	7	2	8	4

SUDOKU #4

8	2	1	7	4	5	6	3	9
3	4	6	1	9	2	5	8	7
9	7	5	3	6	8	4	1	2
6	8	7	5	1	9	3	2	4
2	1	3	6	7	4	9	5	8
5	9	4	2	8	3	7	6	1
4	5	8	9	2	6	1	7	3
7	3	9	8	5	1	2	4	6
1	6	2	4	3	7	8	9	5

Brainteasers

Page 2 Shadow; Arrow
Page 4 An egg; Silence
Page 5 The parrot is deaf.

Send ideas and comments to:

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UNTIL NEXT TIME !